

Introductory Statement

by V. B. Vouk*

It is a pleasure for me to welcome, on behalf of Dr. Mahler, Director-General of the World Health Organization, the participants in this Symposium on Potential Health Hazards from Technological Developments in the Rubber and Plastics Industries. At the same time, I should like to convey to the Government of the United States Dr. Mahler's appreciation of the generous support provided for this joint NIEHS/WHO activity. WHO is particularly grateful to Dr. David Rall, Director of the National Institute of Environmental Health Sciences and Head of the WHO Collaborating Centre on Environmental Health Effects, who first proposed this symposium, and to Dr. Hans L. Falk, Associate Director for Program, NIEHS, who carried the burden of its organization.

It is appropriate to consider the present symposium as the second (international) phase of the NIEHS Conference on Public Health Implications of Components of Plastics Manufacture, which was held at Pinehurst, N.C. July 29-31, 1974 (1).

One of the objectives of environmental health programs is the early identification of potential health hazards arising from adverse environmental situations, in order to design preventive measures capable of improving environmental conditions before the perturbations of community health parameters go beyond acceptable levels. The design of such preventive measures requires the application of technology forecasting to environmental health, i.e., the systematic surveillance, analysis, and evaluation of technological developments and assessment of the potentially adverse effects such developments may have on human health (2). This surveillance has to begin when a new process is still at the laboratory stage; it has to continue through the

pilot-scale trials and when the new process has reached full-scale industrial production. An important component of this activity is environmental and health monitoring of workers (3), including early detection of any health impairment due to occupational exposure (4). The methods for forecasting environmental health hazards are in their infancy and NIEHS is one of the few research institutes in the world that has included technology surveillance in its program (5).

The plastics industry, which includes the production of man-made fibers and synthetic rubbers, began a period of rapid growth in the late 1930's. Expansion has continued until today. It is now one of the most important branches of the chemical industry and uses a wider variety of chemicals than any other technology. According to recently published estimate (6), the total current world production of polymer materials is of the order of 80 million tons; plastics such as polystyrene, poly(vinyl chloride) and polyalkanes amount to about 40 million tons; synthetic fibers (e.g., polyester, nylon, and acrylics) to 30 million tons, and rubbers (styrene-butadiene, polybutadiene) to about 10 million tons. As to the end use, the estimated distribution is as follows (in million tons): construction, 10; packaging, 12; consumer nondurable products, 3; clothing, 13; other consumer products, 19; transportation, 9; other uses, 14. If the growth of the plastics industry continues without restraint, the total product could reach 1475 million tons in the year 2000 (though this is unlikely, and a more reasonable estimate is some 425 million tons). These figures give an idea of the magnitude of the environmental health problems related to the growth of the polymer industry. The annual per capita consumption, however, varies greatly from one country to another as illustrated by the consumption figures for plastics. By far the largest consumption is in the USA and Japan (44 kg

* Chief, Control of Environmental Pollution and Hazards, Division of Environmental Health, World Health Organization, Geneva.

per person per year) followed by Europe (35 kg), whereas the rest of the world consumes only 2 kg per person per year.

In addition to the monomers, the health hazards of the polymer industry are associated largely with the various additives used to improve the technological processes and the quality of the products. They include plasticizers, stabilizers, activators, fillers, pigments, and a variety of catalysts. Although many of these hazards have been known throughout the history of the polymer industry, it was believed that they were well controlled, at least in the major establishments, and that the health hazards for the general public were negligible. The renewed interest in this branch of occupational and environmental health is due to reports published since the early part of 1974 on the death of PVC workers from liver angiosarcoma, thought to be related to occupational exposure to vinyl chloride (VC). At the same time, it was realized that large unaccounted losses of VC occurred during polymerization, estimated to exceed, in the USA, 100,000 metric tons annually, and that large quantities of PVC were being discharged into the environment during PVC production, amounting in the USA to more than 25,000 metric tons per year. This, plus reports that finished PVC products contained entrapped unreacted monomer varying between 5 and 1000 ppm, depending on the age of the product, has raised the question of public health hazards in the use of plastic materials in a variety of consumer products, such as food packaging materials and the piping for drinking water systems (7).

Although it would be inappropriate to exaggerate these facts, national health authorities, industry, and international organizations concerned with health should pay greater attention to the potential health hazards involved in the manufacture, distribution, and use of polymer materials, in order to identify the problem at an early stage and thus minimize the need for corrective action which may have undesirable economic repercussions. I hope that the present symposium will contribute to elucidation of the hazards and point to the preventive action to be taken.

REFERENCES

1. Environmental Health Perspectives, Vol. 11, June 1975, National Institute of Environmental Health Sciences, Research Triangle Park, N.C., U.S.
2. WHO Study Group. Health hazards from new environmental pollutants. WHO Technical Report Series No. 586, Geneva 1976.
3. WHO Expert Committee. Environmental and health monitoring in occupational health. WHO Technical Report Series, No. 535, Geneva, 1973.
4. WHO Study Group. Early detection of health impairment in occupational exposure to health hazards. WHO Technical Report Series, No. 571, Geneva, 1975.
5. National Institute of Environmental Health Sciences, Intramural Research 1974-1975. Research Triangle Park, N.C., U.S.
6. Youle, P. V., and Stammers, J. R. Polymers in an age of sense. *Chemistry in Britain*, 12: 53 (1976).
7. Environmental Protection Agency (U.S.). Preliminary assessment of the environmental problems associated with vinyl chloride and poly(vinyl chloride). Report on the activities and findings of the Vinyl Chloride Task Force, Environmental Protection Agency, Washington, D.C., September 1974.